

Final Report

**2012 Outreach Program
Kaktovik, Alaska**

prepared for



U.S. Fish & Wildlife Service
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by

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Summer Science Program Summary

The University of Texas Marine Science Institute (UTMSI) partnered with the Arctic Refuge of the U.S. Fish and Wildlife Service (USFWS) to offer another successful Summer Science Program in Kaktovik, AK this year. The weeklong program was held at the Harold Kaveolook School from August 6 – 12, 2012. Over twenty students (Table 1) from the local community, whose ages range from 3-17, were

Table 1. Students involved in the 2012 Summer Science Program.

involved in all or part of the week’s activities. Julie Findley, a retired teacher from Port Aransas, TX served as the master teacher and was assisted by Meghan Murphy (USFWS), Carla Stanley (Friends of Alaska’s Refuges) and Susan Linn (UTMSI). Dr. James McClelland (UTMSI) and Roy Churchwell (University of Alaska Fairbanks) joined the

Students	
Melanie Tikluk	Jeanette Killibear
Roy-Robert Fisher Atookchook	Jimallen Killibear
Ian Kayotuk	JD Tikluk
Larry Tikluk	Arianna Boyd
Georgianna Tikluk	Lenora Going
Bradley Brower	Lydia Going
Charles Brower	Michael Klein
Thea Lampe	Troy Klein
Danielle Woods	Nick Gordon
Flossie Lampe	Ben Exe
Nathan Gordon Jr.	Sean Kayotuk

program as visiting experts and shared their expertise with the students. Ted Dunton and John Dunton captained the R/V Proteus, which was used to take students on sampling trips in Kaktovik Lagoon.

For the second year in a row, the Summer Science Program introduced students to many different aspects of marine science through a variety of classroom, laboratory and field activities (Table 2). Each student received a field notebook they used to record data and field observations throughout the week. In the field, students were taken out on the R/V Proteus to participate in plankton tows, benthic grabs, trawls, and water sampling in order to explore Kaktovik Lagoon (Figure 1). The samples collected in the field were transported back to the classroom where they were analyzed and used as the basis for classroom discussions. Plankton samples were examined

under microscopes, and then used as a reference for students to create their own plankton species using various art supplies. Water samples collected in Kaktovik Lagoon from the R/V Proteus were analyzed in the classroom using LaMotte water quality monitoring kits, which allowed students to measure the salinity, oxygen concentration, pH and nutrient concentrations of the water samples. Water samples were also collected from an inland freshwater lake and analyzed using the same kits, allowing the students to compare water from their local, brackish lagoon to the lake that holds the town's water supply. This year, in addition to water testing, students also analyzed soil samples collected from the banks of the freshwater lake for the in situ concentrations of several nutrients critical to plant growth. Similar to the 2011 program, fish caught in Kaktovik Lagoon were used along with fish molds to explore the Japanese art of Gyotaku. The younger students in town joined the older students for the afternoon, and everyone practiced their fish printing skills by creating their own Gyotaku pillowcase (Figure 2).

Table 2. Topics covered in the 2012 Summer Science Program.

Day	Topics Covered
Monday	Bathymetry Navigation
Tuesday	Zooplankton Waves Thermohaline Circulation
Wednesday	Food Webs The Art of Fish Printing
Thursday	Watersheds The Hydrologic Cycle Fish Anatomy
Friday	Bird Migrations Geocache Hunt

In the classroom, students learned about a diverse array of topics in marine science including coastal erosion, wave dynamics, bathymetry, shark anatomy, and the hydrologic cycle. Students used recycled soda bottles to build an en eco-column that allowed them to simulate how the hydrologic cycle works (Figure 3). Trophic relationships were explored by dissecting pellets from local snowy owls. The small bones that were extracted from the owl pellets were sorted into general categories to determine the type and quantity of food the owls were eating (Figure 4). Following a presentation on the diversity of bathymetric features, students created their own

models of the seafloor using modeling clay (Figure 5). Dr. McClelland joined the program for a morning to discuss watersheds dynamics and how activities on land affect the world's oceans. Roy Churchwell shared his knowledge of local bird migrations by explaining the forces driving migration, and the mechanisms that allow birds to make these annual journeys.

Building upon last year's activities, students once again examined coastal erosion by marking the bluff's extent using GPS units to see how coastal erosion has affected Barter Island over the past year. Due to the popularity of shark dissection in last year's Summer Science Program, sharks were once again dissected, but this time, adult sharks were dissected instead of the fetal sharks used in last year's activities. By dissecting adult sharks this year, students were able to find many interesting things inside the sharks including undigested fish, fetal sharks and eggs (Figure 6). The students celebrated a great week of science by completing a geocache hunt using GPS units to find hidden tokens around town. The students were then able to redeem their tokens for a variety of prizes during a live auction. The students expressed great interest and enthusiasm during the summer program and are looking forward to next year's activities.

Student-Led Field Program

In April, a student-led field program was created in an effort to involve older Kaktovik students in Drs. Dunton and McClelland's National Science Foundation funded research project. Students from the Kaveolook School were trained and hired to collect weekly data under the ice. The six high school students involved in the field program were Nathan Gordon Jr., Georgiana Tikluk, Nathaniel Gordon, RoyRobert Fisher-Akootchook, Ellis Tikluk and Archie Brower. Since it is logistically very difficult to collect samples year round in the Arctic Ocean, the students' dataset is critical to understanding the biological processes occurring beneath the ice. Students were able to collect this data on a weekly basis, which makes this dataset very unique

because it captures weekly variations in biological activity that are often missed by researchers who don't permanently live at their research sites. The students visited their sampling site in Kaktovik Lagoon each week accompanied by either Robert Thompson or Fenton Rexford, who are both elders in the village. During each trip, students collected water samples from multiple depths using a van Dorn bottle, measured various water quality parameters using a YSI datasonde, retrieved small animals from a benthic trap, and were responsible for documenting findings from each sampling trip in a field notebook (Figure 7). Both Drs. Dunton and McClelland hope to incorporate the students' data set into their larger study of the coastal lagoons in the Eastern Beaufort Sea. In addition, Drs. Dunton and McClelland hope to bring these students to a regional scientific conference where they can present their data.

Future Recommendations

In the past two years (2011, 2012), the Summer Science Program was designed for the middle school and high school students in Kaktovik AK, but the goal of next year's program is to engage the youngest students from the area. Our focus for the 2013 Summer Science Program are children in the 5-10 age bracket, and will aim to introduce these elementary aged students to the basics of scientific discovery and oceanography. Next year's camp will include 5 half-day sessions aimed to expose elementary school students in Kaktovik to basic oceanographic principles through a variety of classroom and simple laboratory activities. The Summer Science Program has successfully involved most of Kaktovik's middle school and high school students in our research project, but we have yet to formally reach out to the youngest students in Kaktovik. In an effort to give the most dedicated middle school and high school students an opportunity to stay involved in our outreach efforts, we hope to use them as student teachers during next year's Summer Science Program.

Following the success of the student-led field program in the spring 2012, we hope to continue this program once the ice-covered period resumes. Ideally, students would be able to collect weekly samples throughout the entire ice-covered period, weather permitting. We hope to work with the students to analyze their data, so that some of the students can present this very unique dataset at a regional science conference.

Overall, our K-12 science programs were a huge success in 2012, and we hope to continue our outreach efforts in the upcoming year, as well as expand our program to include more members of the Kaktovik community. The 2012 program expanded upon a longtime partnership between UTMSI, the Arctic Refuge (USFWS) and the village of Kaktovik, a partnership that continues to involve Kaktovik students and community members into the scientific processes of observation, measurement and discovery.

Figures



Figure 1. Students sort invertebrates collected using a benthic grab on the R/V Proteus.

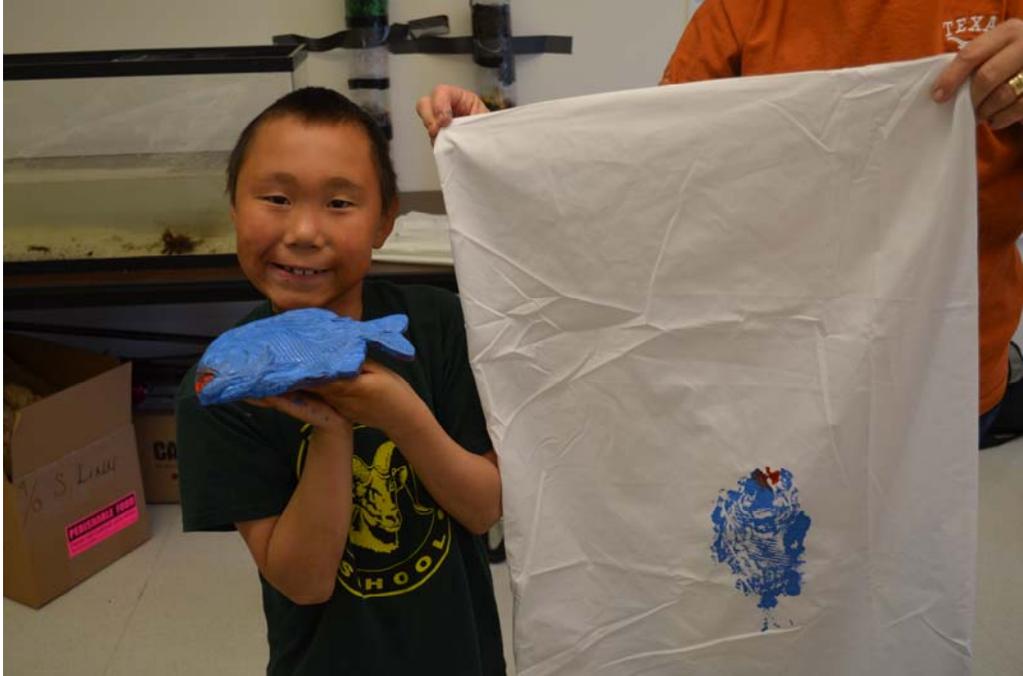


Figure 2. The youngest students in Kaktovik joined the Summer Science Program to learn about the ancient art of Gyotu, and make their very own fish print pillowcase.



Figure 3. Students used recycled soda bottles to explore the concept of watersheds and recreate the water cycle.



Figure 4. Students extracted small bones from owl pellets in order to discover what the local snowy owls had been eating.



Figure 5. After a discussion on bathymetry, students used clay to create their own models of the seafloor.



Figure 6. Students explore anatomy by dissecting a spiny dogfish shark.



Figure 7. The members of the Student Sampling Program deploy a YSI datasonde at their sampling site in Kaktovik Lagoon.